Alex

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MINNOVA INC. **Memorandum**

SAMATOSUM PROJECT

DATE: July 4, 1991

TO: Alex Davidson

COPIES TO: D. Watkins

FROM: John Purkis

SUBJECT: Tulsequah Chief - Review of NSR Calculations

At Prices - Cu $ 1.00
Zn .55
Pb .30
Ag 4.80
Au 380.00

Exch. 1.15

These prices used as Westmin info was based on these.

	Westmin	Tulsequah 1st Pass	Tulsequah 2nd Pass
Feed Grades			
Cu (%)	1.94	1.55	1.55
Zn (%)	3.65	6.81	6.81
Pb (%)	0.21	1.23	1.23
Ag (g/t)	29.3 .854	109.0 3.18	109.0
Au (g/t)	2.2 .064	2.7 .0787	2.7
Gross Value/t milled	$138/t	~ $201/t	$201/t
NSR /t milled	~ 62/t	~ 66/t	82/t
NSR/Gross Value	0.45	0.32	.41

The price difference between first pass and second pass is due to freight where Samatosum rates truck/rail/ship and bags are extraordinarily high. I have used Westmin rates plus $10. Also, I increased Cu and Ag recoveries to Cu Conc by 2%.

Page 2 (cont'd)

Tulsequah, though, will never equate to Westmin exactly due to:

1. Pb concentrate will lead to lower Cu payable. Cu is lost to Pb conc. (Same true for Zn payable).

2. As and Sb are much higher.

Therefore, does a $15/t milled NSR increase change the original conclusions? i.e., if NSR at Feasibility Prices = $78/t.

If Op Costs ($/t) =	40		50		60	
Margin ($/t) =	38		28		18	
@ Op rate (tpd)	1500	2000	1500	2000	1500	2000
Therefore Op Profit $MM/Yr @ 15% DCF Rate	20.8	27.7	15.3	20.4	9.9	13.1
Yrs to generate +$100MM NPV	9.0	5.0	+25.0yrs	9.5	n/a	n/a
Mining Reserve Required MMt	4.93	3.65	+13.7	6.94	n/a	n/a
Yrs to generate +$125MM NPV	16.0	8.0	n/a	18.0	n/a	n/a
Mining Reserve Required	8.76	5.84	n/a	13.14	n/a	n/a
Yrs to generate +$150MM NPV	n/a	12.0	n/a	n/a	n/a	n/a
Mining Reserve Required	n/a	8.76	n/a	n/a	n/a	n/a

An optimistic approach would say $50 Op Cost and therefore $28 Op Margin. At 2000 tpd, it doesn't really make it, except at $100MM capital which is almost certainly on the low side for this project.

Therefore, one needs a higher tonneage rate;

if 2500 tpd and $125MM Capital - need 9.5 years and 12.1 MM tonnes

@ 3000 tpd and $125MM Capital - need 7.0 years and 7.7 MM tonnes.

This would equate to geological reserves of 16 and 10 million tonnes respectively.

I still have doubts about the mining rates above 2000 tpd in this orebody. But, if orebody is +10 million tonnes, then this may change.

JOHN PURKIS
Mine Manager

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